indicate that they are concave to the surface and this aspect is correspond to the COMPO image. The concentration of Al in the glass phase on the grain boundary is presumed to be high from the characteristic X-ray analysis. EDS analysis showed that a large amount of SiO_2 and a small amount of alkali were found in the cristobalite phase and a large amount of Fe_2O_3, CaO and K_2O are dissolved in the glass phase. *[Received June 16, 1986]*

HIP'ing of Silicon Nitride with a Small Quantity of $BeAl_2O_4$

Haruo YOSHIDA, Shoichi KUME and Michihide MACHIDA

(Government Industrial Research Institute, Nagoya
1-1, Hirate-cho, Kita-ku, Nagoya-shi 462)

Silicon nitride with a small quantity (0. 1, 0. 3 and 1 wt%) of $BeAl_2O_4$ was sintered by HIP. Properties of sintered bodies were studied through measurement of bulk density, 4-point bending test and so forth. The bulk density of the sintered body containing 0. 3 wt% $BeAl_2O_4$ was almost theoretical when sintered above 1900°C at an applied pressure of 200 MPa for 1. 5 h. Strength of Si_3N_4 containing 1 wt% $BeAl_2O_4$ did not drop at all up to 1200°C. For less than 0. 3 wt% addition, a rise of strength was measured at high temperature (1200°C). *[Received June 23, 1986]*

Solid Particle Erosion of Brittle Materials (Part 2)
——The Relation between Erosive Wear and α- or β-Phase Content of Hot Pressed Si_3N_4——

Shigetaka WADA and Naoyoshi WATANABE

(Toyota Central Research and Development Laboratories, Inc.
Nagakute, Aichi 480-11)

The Vickers hardness of α-Si_3N_4 is higher than that of β-Si_3N_4. The erosive wear caused by solid particle impingement was tested for a series of hot pressed Si_3N_4 ceramics with different phase contents of Si_3N_4. The anti-erosive wear property of Si_3N_4 including α-phase was inferior to that of 100% β-Si_3N_4. The poor anti-erosive wear of Si_3N_4 including α-phase is due to its low fracture toughness (K_c) in spite of its high hardness (H). The erosion rate (V) of hot pressed Si_3N_4 is related to H and K_c by the equation $V = e^{8.74} H^{-8.37} K_c^{-7.1}$, derived from multiple regression analysis. *[Received August 7, 1986; Accepted October 14, 1986]*

Behavior of Mirror-Like Region of Sintered Si_3N_4 under Rotary Bending

Haeng-Nam KO

(Nakanihon Automotive College
Sakahogi-cho, Kamo-gun, Gifu 505)

The rotary bending test was carried out on sintered Si_3N_4 at room temperature in the range from 10^4 to 10^9 stress-cycles with an Ono's rotary bending fatigue testing machine operating at 3400 cycles per minute. Mirror-like regions were observed on the fracture surfaces after the test. The mirror-like region was roughly semicircular, and the fracture propagated radially from the mirror-like region. The size of mirror-like region was determined from optical micrographs at a magnification of 25. The size of mirror-like region was correlated with the stress amplitude and the number of cycles to failure. The failure was shown to occur when stress intensity factor at the deepest point of the mirror-like region reached fracture toughness of the material. It was considered that the mirror-like region was restricted to the subcritical crack growth under the cyclic stress, and the failure occurred when its size reached a critical value which is dependent on the stress amplitude.

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